Method of Test for
DETERMINATION OF DELETERIOUS MATERIALS
DOTD Designation: TR 119-92

I. Scope

This method of test describes the procedure for determining the percentages, by weight, of deleterious materials in aggregate. Deleterious materials consist of wood, clay lumps, friable particles, coal and lignite, flat or elongated particles, glassy particles, and iron ore as defined in Table 1.

II. Apparatus

A. Balance
   1. A 30 lb or more capacity balance sensitive to 0.01 lb for determining the percent wood and clay lumps.
   2. A 2 kg or more capacity balance sensitive to 0.1 g for determining the other types of deleterious materials.

B. Oven - An oven capable of maintaining a temperature of 230±9°F (110±5°C).

C. Sieves - Nos. 4 and 16 sieves.

D. Sample Pans - Rust-resistant pans of a size and shape that will permit the spreading of the sample on the bottom in a thin layer.

E. Aggregate Test Report

III. Sample

A. Wood and Clay Lumps: One full sample sack of material.

B. Other Deleterious Materials:
   1. Coarse Aggregate - Representative portion of approximately 2000 g of material retained on the No. 4 sieve.
   2. Fine Aggregate - Representative portion of a minimum of 500 g of material retained on the No. 16 sieve.

IV. Procedure

A. Wood and Clay Lumps
   1. Pour the undried sample into a tared sample pan and record the total wet weight of the sample as T_W.
   2. By visual inspection, remove all particles of wood (sticks, bark, etc.) and clay lumps from the sample.
   3. Place the removed wood into one pan and clay lumps into another. Obtain and record the wet weights to the nearest 0.01 lb. Record the wet weight of wood as A and the wet weight of clay lumps as B on the worksheet (Figure 1).

B. Other Deleterious Materials
   1. After removal of wood and clay lumps, oven dry the sample to constant weight at 230±9°F (110±5°C).
   2. Select the representative portion given in Step III (B) in accordance with DOTD TR 108.
   3. Weigh and record the weight of the dried representative portion as T_d to the nearest 0.1 g (Figure 1).
   4. Spread the dried material in a thin layer on a clean dry surface of sufficient area so that the individual particles can be visually inspected.
   5. Using Table 1 as an aid, identify and separate each type of deleterious material from the remainder of the dried representative portion by placing in separate sample pans.
   6. Obtain the dry weight of each type of deleterious material to the nearest 0.1 g. Record these weights as C, D, E, F & G (Figure 1).

V. Calculations

A. Calculate the percent of wood and clay lumps (P_W) in the sample to the nearest 0.01% using the following formual:

$$P_W = \left(\frac{X_W}{T_W}\right) \times 100$$

where:

X_W = wet weight of wood (A) or clay lumps (B), lb
T_W = wet weight of total sample, lb
100 = constant

example:

X_w = 0.01 lb (wood)
T_w = 34.29 lb (total sample wt)

$$\frac{0.01}{34.29} \times 100$$
$$= 0.00029 \times 100$$
P_w = 0.03%

B. Calculate the percent of each other type of deleterious material (P_d) to the nearest 0.1% using the following formula:

$$P_d = (\frac{X_d}{T_d}) \times 100$$

where:

X_d = dry weight of deleterious material, g (C, D, E, F, or G)
T_d = dry weight of representative portion, g
100 = constant

example:

X_d = 42.3 g (friable particles)
T_d = 1960.8 g (representative portion)

$$\frac{42.3}{1960.8} \times 100$$
$$= 0.02157 \times 100$$
P_d = 2.2%

C. Calculate the total percentage of clay lumps and friable particles by adding the percent clay lumps (I) and the percent friable particles (J).
D. Calculate the total percentage of wood, clay lumps, friable particles, coal and lignite by adding the percent wood (H), clay lumps (I), friable particles (J), and coal and lignite (K).

VI. Report

A. Report the percentages of wood and clay lumps to the nearest 0.01% on the Aggregate Test Report.
B. Report the percentages of all other deleterious materials to the nearest 0.1 % on the Aggregate Test Report.

VII. Normal Test Reporting Time

Normal test reporting time is 2 days.

TABLE 1

DELETERIOUS MATERIALS

WOOD - Vegetable matter including bark, sticks and roots.

CLAY LUMPS - Any particle predominantly composed of clay that can be broken into finely divided particles with the fingers while damp.

FRIABLE PARTICLES - Any particle other than clay that can be broken into finely divided particles with the fingers.

COAL AND LIGNITE - Lightweight black or brownish black particles formed by the decomposition of vegetable matter. Lignite is a low grade of coal in which the texture of the original wood is distinct.

FLAT OR ELONGATED PARTICLES - Particles having lengths equal to or greater than five times their average thickness.

GLASSY PARTICLES - Particles of slag having a slick, smooth, glassy finish on any surface.

IRON ORE - Rough textured, soft, yellow, brown, or black porous particles (called limonite) or hard, dark reddish or brown conglomerate particles (called hematite).

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Louisiana Department of Transportation and Development

DELETERIOUS MATERIALS IN AGGREGATE
DOTD TR 119

Material: _____ State Project No.: _____

Lab. No.: _____ Sample No.: _____

DELETERIOUS MATERIAL:	Total Sample Wt., lb or g (T_w) 34.29 / Representative Portion, g (T_d) 1960.8		WEIGHT	PERCENT OF DELETERIOUS MATERIAL	
WOOD	$H = (A/T_w) \times 100$	A	0.01	H	0.03
CLAY LUMPS	$I = (B/T_w) \times 100$	B	0.01	I	0.03
FRIABLE PARTICLES	$J = (C/T_d) \times 100$	C	42.3	J	2.2
CLAY LUMPS & FRIABLE PARTICLES			X	I + J	2.2
COAL & LIGNITE	$K = (D/T_d) \times 100$	D	10.7	K	0.5
TOTAL	H + I + J + K		X	H + I + J + K	2.8
FLAT OR ELONG. PARTICLES	$L = (E/T_d) \times 100$	E	29.0	L	1.5
GLASSY PARTICLES	$M = (F/T_d) \times 100$	F	15.1	M	0.8
IRON ORE	$N = (G/T_d) \times 100$	G	31.6	N	1.6

Intended Use: _____

Remarks: _____

Tested By: J.H. Date: 1-17-92

Checked By: R.C. Date: 1-17-92

Approved By: Lab. Engr. Date: 1-17-92

Figure 1